

Epidemiological profile of abnormal hepatic function tests at the Avicenne Marrakech military hospital

Haddi Inssaf ^{1,2,*}, Mansar Nouha ^{1,2}, Hamdi Hachim ², Tahiri Zakaria ^{1,2}, Boukhira Abderrahman ^{1,2} and Chellak Saliha ^{1,2}

¹ Department of Biochemistry-Toxicology, Avicenne Military Hospital of Marrakech, Morocco.

² Faculty of Medicine and Pharmacy of Marrakech, University Kadi Ayad, Morocco.

GSC Biological and Pharmaceutical Sciences, 2025, 32(02), 255-260

Publication history: Received on 13 July 2025; revised on 23 August 2025; accepted on 25 August 2025

Article DOI: <https://doi.org/10.30574/gscbps.2025.32.2.0337>

Abstract

The epidemiology of liver function test abnormalities is an important research area aimed at understanding the prevalence, distribution, and risk factors associated with these disorders. This is a retrospective study conducted over a period of 6 months. The study population consists of all patients hospitalized at the Avicenne Military Hospital in Marrakech with abnormal liver function tests. Data collection was carried out using a questionnaire.

Ninety patients with abnormal liver function tests were included, with a mean age of 52.5 years. Males represented 53.3% of the cases, while females accounted for 46.7%, with a sex ratio of 1.14. The main medical histories were type 2 diabetes (18.9%) and smoking (17.8%), followed by hypertension (10%). The most common functional symptoms were asthenia (33.3%), followed by abdominal pain (27.7%) and fever (20%). Physical signs were dominated by jaundice (34.4%), followed by ascites (21.1%) and hepatomegaly (16.6%). Biological abnormalities were predominantly elevated AST (77.7%), followed by ALT (64.4%) and GGT (62.2%), then ALP (48.8%) and bilirubin (44.4%). The most frequent ultrasound abnormalities were hepatomegaly (33.9%) and ascites (25.4%). The etiologies responsible for liver function test abnormalities were predominantly cirrhosis (15.5%), followed by lithiasis cholecystitis (11.1%) and hepatocellular carcinoma (8.9%).

Keywords: Epidemiology; Abnormalities; Liver function tests; ALT; AST

1. Introduction

The liver is a marvelously resilient and vital organ that plays an indispensable role in nurturing and protecting the body everyday with clockwork precision. The liver supports almost every organ in the body and is vital for survival. It has several key functions to perform. It helps filter and dispose off toxic materials from the blood, feeds the body the energy it needs to function, wards off viruses and infections, produces blood-clotting factors, and regulates sex hormones, cholesterol levels and vitamin and mineral supplies in the body. In fact, the liver performs over 500 functions, far more than any other organ in the body (1).

Liver diseases represent a wide array of disorders characterized by hepatocyte injury, inflammatory cell infiltration, and hepatic stellate cells (HSC) activation, which cumulatively impair liver function and disrupt its architecture (2). Annually, liver diseases are linked to approximately 2 million deaths and account for 4% of global mortality (3). Acute liver diseases often result from hepatotropic virus infections, though drug-induced liver injury (DILI) is also becoming increasingly prevalent worldwide. Chronic liver conditions, on the other hand, typically arise from factors like alcohol consumption, hepatitis B virus (HBV), and hepatitis C virus (HCV) infections, along with a rising incidence

* Corresponding author: Haddi Inssaf.

of metabolic dysfunction-associated steatotic liver disease (MASLD) globally (4). Progression from such chronic conditions to end-stage liver diseases, including cirrhosis and liver cancer, contributes significantly to morbidity and mortality (3).

Therefore, this review provides a comprehensive examination of the epidemiology and characteristics of liver diseases, in addition, this study will explore the main risk factors associated with liver balance abnormalities, exposure to toxins, alcohol consumption, infectious diseases, metabolic disorders, and other clinical situations.

Ultimately, the aim of this study is to define the epidemiological profile of liver abnormalities, to make significant contributions to understanding the impact of these disturbances on public health, and to offer food for thought in optimizing efforts to prevent, diagnose and treat liver disease.

2. Materials and Methods

The study was conducted over a 6-month period, from July to December 2023, focusing on 90 cases with abnormal liver function tests at the biochemistry department of the Avicenne Military Hospital in Marrakech (HMA). It is a retrospective study. For each case, the following parameters were examined: age, sex, AST, ALT, PAL, GGT, and Bilirubin levels. All collected data were entered into and analyzed using Excel software.

Qualitative variables were described as means with standard deviations (SD), while quantitative variables were presented as numbers and percentages.

3. Results

A total of 392 liver function tests were requested for patients treated to HMA during the study period; 90 of these tests were found to be abnormal, indicating a 22.9% prevalence. The patients mean age was 52.5 +/- 14.5 years, with ages ranging from 23 to 76, Most patients (46.6%) were in the 60–79 age range, with an M/F sex ratio of 1.14 and a little male predominance.

The following distribution was found when the medical histories of the individuals were analyzed: No antecedents were provided for 36.7%. 17.8% of individuals had a history of smoking, and 18.9% of cases had type 2 diabetes mellitus. 10% of patients had both hypertension and stomach pain. In 7.8% of instances, there was a history of jaundice and an alcohol use disorder. 6.6% reported exposure to hepatotoxic drugs, 3.3% reported travel to endemic areas, 2.2% reported epistaxis, and 1.1% reported chronic hepatitis B infection.

Functional symptoms varied, with 30 patients (33.3%) reporting asthenia as the most frequent complaint. Fever was reported in 18 patients (20%), weight loss in 17 patients (18.8%), and abdominal pain in 25 patients (27.7%). 10 patients (11.1%) had dyspnea, 11 (12.2%) had chest pain, and 14 (15.5%) had arthritis.

Jaundice was the most prevalent physical symptom, occurring in 31 cases (34.4%). 12 patients (13.3%) had lower limb edema, 15 (16.6%) had hepatomegaly, and 19 (21.1%) had ascites.

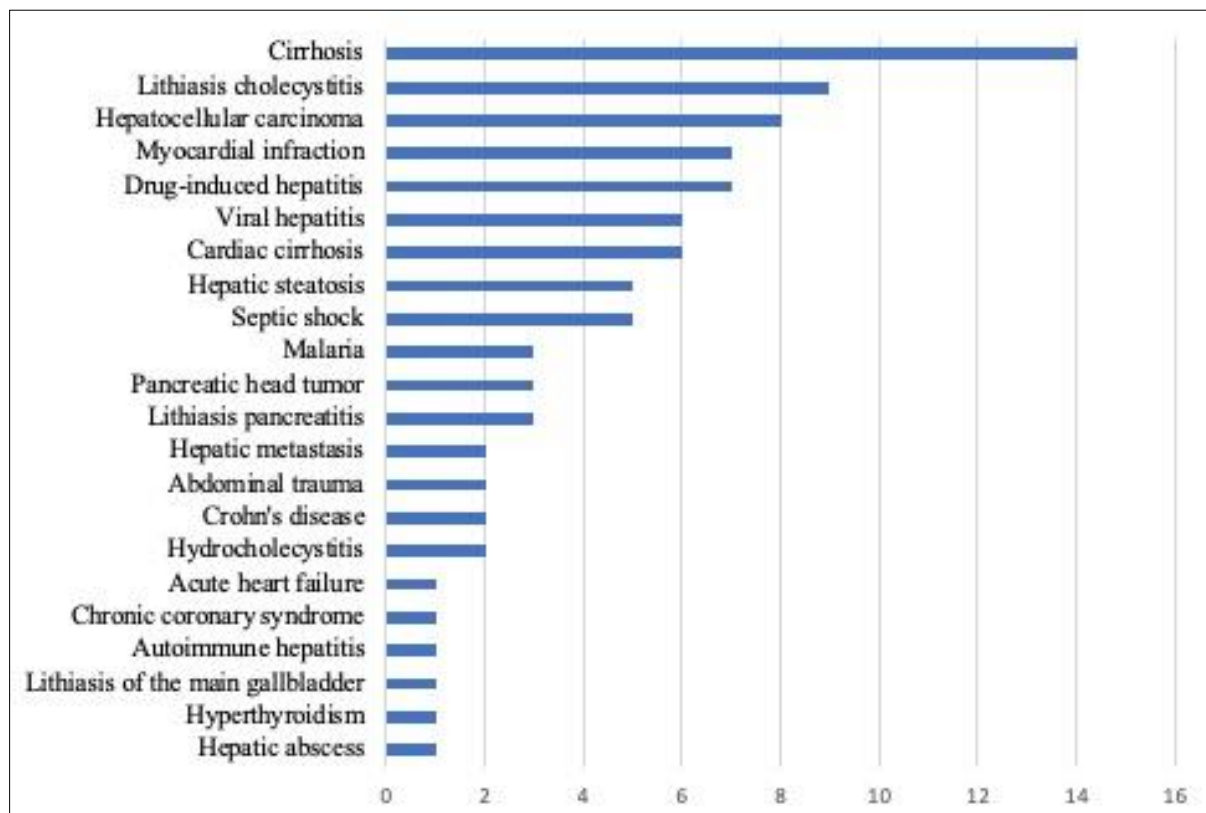
Elevated aspartate aminotransferase (AST) levels were the main indicator of biochemical abnormalities; these were found in 70 individuals (77.7%), with 9 of them having values more than ten times the upper limit of normal. 8 of the cases had comparable significant elevations in alanine aminotransferase (ALT), which was increased in 58 patients (64.4%). 40 patients (44.4%) had high total bilirubin levels, and 56 patients (62.2%) had altered gamma-glutamyl transferase (GGT) levels.

An abdominal ultrasound was performed on 59 (65.5%) of the 90 individuals in our series. Just 7 (16.6%) of these got normal results. Hepatomegaly, ascites, and gallbladder wall thickening were the most commonly seen abnormalities (Table I).

Table 1 Distribution of ultrasound anomalies

Ultrasound features	Number of cases	Percentage
Hepatomegaly	20	33,9 %
Ascites	15	25,4 %
Thickened gallbladder wall	10	16,9 %
Hepatic nodule	9	15,2%
Vesicular calculus	8	13,5%
Dilated portal trunk	7	11,8%
Steatotic liver	6	10,1%
Splenomegaly	5	8,5%
Pancreatic swelling	4	6,7%
Collateral circulation	4	6,7%
Peritoneal effusion	3	5%

An examination of the underlying causes of liver failure further supported these findings, showing that cirrhosis was the most prevalent (14 patients, 15.5%), followed by cholecystitis with gallstones (10 patients, 11.1%) and hepatocellular carcinoma (8 patients, 8.9%) (Figure1).

**Figure 1** Patient distribution by etiologic

Analysis of infectious causes revealed that they were associated with the most marked transaminase elevations. In this group, mean values reached 804 IU/L for ASAT and 896 IU/L for ALAT, reflecting particularly severe hepatocellular damage (Table II).

Table 2 Hypertransaminasemias by etiology

Parameters		AST				ALT			
		1,5N-10N in UI/L		> 10 N in UI/L		1,5N-10N in UI/L		> 10 N in UI /L	
Etiology	Number of cases	Case	Av	Case	Av	Case	Av	Case	Av
Degenerative	24	21	209 UI/L±123	3	687 UI/L±68	21	281 UI/L±189	3	854 UI/L±115
Biliary tract diseases	18	18	115 UI/L±68	-	-	18	139 UI/L±96	-	-
Cardiovascular	15	14	169 UI/L±65	1	643 UI/L	14	120 UI/L±115	1	70 UI/L
Infectious	11	7	111 UI/L±58	4	804 UI/L±117	8	200 UI/L±226	3	896 UI/L±125
Toxics	7	6	251 UI/L±129	1	622 UI/L	6	345 UI/L±230	1	75 UI/L
Metabolic and endocrine	7	7	84 UI/L±31	-	-	7	179 UI/L±75	-	-
Others	5	5	155 UI/L±50	-	-	5	125 UI/L±34	-	-
Auto-immune	3	3	88 UI/L±17	-	-	3	151 UI/L±44	-	-

AST: Aspartate amino transferase; ALT: Alanine aminotransferase; Av: Average value; UI: Unit international

Additionally, different biological profiles were found based on the underlying cause. The greatest increases in gamma-glutamyl transferase (GGT), with a mean value of 428 IU/L, were linked to metabolic diseases. However, more marked elevations in alkaline phosphatase (ALP), with an average of 267 IU/L, and elevated concentrations of total bilirubin (93 mg/L) and conjugated bilirubin (59 mg/L) were found in biliary tract diseases, indicating a greater degree of cholestatic dysfunction (Table III).

Table 3 Averages of other biological parameters by etiology

	Number of cases	ALP (UI/L)	GGT (UI/L)	BT (mg/L)	BC (mg /L)
Degenerative	24	185 UI/L±147	165 UI/L±207	86 mg/L±138	54 mg/L±99
Biliary tract diseases	18	267 UI/L±262	269 UI/L±328	93 mg/L±119	59 mg/L±83
Cardiovascular	15	109 UI/L ±72	123 UI/L±118	27 mg/L±41	14 mg/L±24
Infectious	11	197 UI/L±149	210 UI/L±206	62 mg/L±67	43 mg/L±55
Metabolic and endocrine	7	114 UI/L ±51	428 UI/L±409	29 mg/L±50	17 mg/L±37
Toxics	7	185 UI/L±121	187 UI/L±145	11 mg/L±5	4 mg/L±3
Others	5	80 UI/L±14	37 UI/L± 19	21 mg/L±9	5 mg/L±5
Auto-immune	3	116 UI/L±31	52 UI/L±48	15 mg/L±1	6 mg/L

ALP: Alkaline phosphatase; GGT: Gamma-glutamyl transferase; BT: Bilirubin total; BC: Bilirubin conjugate; UI: Unit international

4. Discussion

A wide variety of hepatic or extra-hepatic diseases may be indicated by abnormal liver function tests, which are frequently seen in clinical practice. This reported prevalence of 22.9% is in line with research by Duh et al. (21.7%) [5], Pendino et al. (15.5%) [6], and Zhang et al. (14.7%) [7]. notably, Djembi [8] proved a significantly lower frequency of 8.9%, which is probably because stronger diagnostic thresholds were used in that study. Excluding this latter result, most studies report prevalence rates within a relatively narrow range of 14% to 23%.

The examination of sociodemographic factors, especially age, offers important insights into the characteristics of patients with abnormal liver function tests. Patients were in age from 23 to 76 years old, with a mean age of 52.5 years. The age range between 60 and 79 years old represented 46.6% of all patients.

These results are largely consistent with those found in the literature. An average age of 53.8 years was found by Duh et al. [5] in Massachusetts, but Zhang et al. [7] in Jilin, China, noted an average age of 47.6 years. The average age was 45.9 years, according to Pendino et al. [6] in Cittanova, Italy, and 41.7 years, according to Djembi [8] in Mali.

Another important epidemiological factor is the distribution of gender differences. With 53.6% men and 46.1% women, it had a slight male predominance, resulting in a sex ratio of 1.1. This result is consistent with the identical sex ratio reported by Zhang et al. [7], notably, Djembi [8] reported a sex ratio of 2.3, indicating a clear male predominance. However, Pendino et al. [6] and Duh et al. [5] discovered a modest female predominance with a sex ratio of 0.9.

To comprehend liver dysfunction, clinical indicators are crucial in addition to demographic information. In our cohort, asthenia (33.3%) was the most frequently reported symptom, followed by fever (20%) and stomach pain (27.7%). Djembi's study [8] somewhat supports these findings, identifying asthenia as the most frequent symptom (89.9%), followed by anorexia (55.7%) and abdominal discomfort (35.8%). Similarly, asthenia was the most common complaint (55.4%), followed by anorexia (36.8%) and abdominal pain (34.6%), according to Drabo's study [9]. All studies highlight the importance of asthenia and stomach discomfort as the main symptoms, despite variations in prevalence rates.

Analyzing bodily symptoms is also essential to comprehending liver dysfunction. Ascites (21.1%) and hepatomegaly (16.6%) were the most common clinical symptoms, followed by jaundice (34.4%). Similar results were seen in Djembi's study [8], where the most common sign was jaundice (50.6%), followed by tachycardia (50%) and hepatomegaly (49.4%). Jaundice was also the most common physical sign (43.3%), followed by ascites (25.9%) and hepatomegaly (23.5%), according to Drabo's study [9]. It should be noted that the most common physical symptom in each of these investigations is still jaundice.

The most common finding was an AST level disturbance, which occurred in 77.7% of cases. Findings from Djembi [8], who reported a greater percentage of 90.3%, are in line with this. On the other hand, ALT was shown to be the most frequently increased enzyme (76.3%) by Drabo [9]. The fact that ALT is more liver-specific whereas AST is seen in other organs beyond the liver may help to explain this discrepancy. Therefore, the higher involvement of ALT may be explained by the prevalence of digestive diseases in Drabo's study.

Normal ultrasonography results were found in 16.6% of cases, which is similar to the percentages reported by Drabo [10] (17.3%) and Djembi [8] (18.1%). In 33.9% of cases, hepatomegaly was the most frequently observed abnormality. This is in line with data from Drabo [9], who reported a prevalence of 38.3%.

In 14 patients (15.5%), cirrhosis dominated by the primary causes of liver dysfunction; this condition may have been related to a tardy diagnosis, lithiasis cholecystitis (11.1%) and hepatocellular cancer (8.9%) came next. These findings are consistent with those of Djembi [8], where cirrhosis was the primary cause (15.9%), followed by hepatocellular carcinoma (14.7%).

A high incidence of cirrhosis (23.5%), viral hepatitis (21.8%), and hepatocellular carcinoma (20.1%) was also noted in Drabo's study [6]. Morocco's classification as a medium-endemic zone, where the prevalence of viral hepatitis fluctuates between 2% and 7%, can be the reason why viral hepatitis accounted for just 5.5% of cases in this study.

5. Conclusion

The epidemiology of abnormal liver function tests is a critical field of study, aiming to understand the prevalence, distribution, and risk factors associated with these disorders, which pose a significant epidemiological challenge due to their high frequency and diverse etiologies. The detection of abnormal liver function is often based on routine examinations, uncovering underlying pathologies that may otherwise remain asymptomatic.

Compliance with ethical standards

Acknowledgments

The authors thank the medical and administrative staff of Avicenne Military Hospital of Marrakech and the team at the Laboratory of Annales Medical for their valuable support.

Disclosure of conflict of interest

The authors declare no conflicts of interest.

Statement of ethical approval

The present research work does not contain any studies performed on animals/humans subjects by any of the authors Ensuring patients are fully informed before undergoing procedures.

Statement of informed consent

Written and informed consent for publication of this case report.

References

- [1] kotak et al, Investigation of Epidemiology and Etiology of Liver Diseases and Characterization of Its Association with Various Factors, Institute of Pharmacy, Nirma University, A'bad, 2014.
- [2] Han, H. et al. Danger signals in liver injury and restoration of homeostasis. *J. Hepatol.* 73, 933–951 (2020).
- [3] Devarbhavi, H. et al. Global burden of liver disease: 2023 update. *J. Hepatol.* 79, 516–537 (2023).
- [4] Wong, M. C. S. et al. The changing epidemiology of liver diseases in the Asia-Pacific region. *Nat. Rev. Gastroenterol. Hepatol.* 16, 57–73 (2019).
- [5] Duh MS, Walker AM, Kronlund KH Jr. Descriptive epidemiology of acute liver enzyme abnormalities in the general population of central Massachusetts. *Pharmacoepidemiol Drug Saf.* 1999 Jul;8(4):275-83. doi:10.1002/(SICI)1099-1557(199907)8:4<275::AID-PDS427>3.0.CO;2-D.PMID: 15073920.
- [6] Pendino GM, Mariano A, Surace P, Caserta CA, Fiorillo MT, Amante A, Bruno S, Mangano C, Polito I, Amato F, Cotichini R, Stroffolini T, Mele A; ACE Collaborating Group. Prevalence and etiology of altered liver tests: a populationbased survey in a Mediterranean town. *Hepatology.* 2005 May;41(5):1151-9. doi:10.1002/hep.20689. PMID: 15841464.
- [7] Zhang H, He SM, Sun J, Wang C, Jiang YF, Gu Q, Feng XW, Du B, Wang W, Shi XD, Zhang SQ, Li WY, Niu JQ. Prevalence and etiology of abnormal liver tests in an adult population in Jilin, China. *Int J Med Sci.* 2011 Mar 25;8(3):254-62. doi: 10.7150/ijms.8.254. PMID: 21487569; PMCID:PMC3074091.
- [8] DJEMBI DJATCHEDJIE LILIANE NICOLE ,ETIOLOGIES DES HYPERTRANSAMINASEMIES DANS LES SERVICES DE MEDECINE INTERNE DE L'HOPITAL DU POINT G ET D'HEPATO- GASTRO-ENTEROLOGIE DE L'HOPITAL GABRIEL TOURE Thèse pour obtenir le grade de Docteur en Médecine. Bamako : Faculté de Médecine de Pharmacie et d'Odontostomatologie du MALI 11, 2002, 76 p.
- [9] Docteur Sabine Marie Marguerite DRABO ,Étiologies de la cytolyse hépatique au service d'hépto-gastro-entérologie du CHU Gabriel Touré Mémoire pour obtenir le grade de spécialiste en Hépto-Gastro-Entérologie. Bamako : FACULTÉ DE MÉDECINE ET D'ODONTO-STOMATOLOGIE 3, 2021,36 p.
- [10] A. Boufars, R. Hadeif, A. Saadi, R. Razine, E. Bouaiti, M. Mrabet,Séroprévalence de l'hépatite virale dans une population jeune au Maroc, *Revue d'Épidémiologie et de Santé Publique*,Volume 62, Supplement 5,2014,Page S231,ISSN 0398-7620,https://doi.org/10.1016/j.respe.2014.06.193.